

Kanuti NWR Progress Report FY09-01
Aerial Surveys of Molting Geese on Kanuti National Wildlife Refuge, July 2009

Purpose: Aerial survey of molting Greater White-fronted and Canada geese
Location: Kanuti National Wildlife Refuge, Koyukuk and Kanuti rivers, and Lake Todatonten
Dates: July 10–11, 2009
Participants: Mike Spindler, Pam Valle
Author: Christopher M. Harwood
Report Date: September 24, 2009

Summary:

During July 10-11, 2009, Refuge Manager/Pilot Spindler and Biological Technician Valle conducted aerial surveys of molting Greater White-fronted Geese (*Anser albifrons*; “white-fronts”) and Canada Geese (*Branta canadensis*). A reduced effort targeting historical “hot spots” was employed for the first time. The crew surveyed 25 (of historical 101) aerial line transects overlaying goose habitat on Kanuti National Wildlife Refuge (KANWR) in three core areas, as well as nearby Lake Todatonten and the terminus of the Kanuti River. Totals of 548 white-fronts (425 adults and 123 young) and 313 Canada Geese (134 adults and 179 young) were observed. Most white-fronts were again found in the traditional “Mud Lakes” area. Additional geese were observed incidentally in non-transect surveys of portions of the main stem Koyukuk River, Kanuti River, and Kanuti Chalatna Creek. Spring surveys for breeding pairs of geese were discontinued by refuge staff this year; however, geese were documented in Migratory Bird Management’s aerial waterbird breeding pair survey of the refuge on May 23.

Background:

Kanuti NWR has participated in the coordinated aerial molting white-front survey effort in interior Alaska since 2001, except for 2004 and 2005 when smoke precluded surveying (see Fischer [2006a] and Saperstein [2005] for a history and rationale of the collective and Kanuti NWR-specific efforts concerning monitoring Alaska’s mid-continent white-front population). Discussions with Migratory Bird Management (MBM) staff in recent years about the efficiency of KANWR’s molting survey prompted a change in protocol which resulted in a reduced effort for 2009 (see Fischer 2009 addendum). Given the seeming predictable distribution of molting geese on the refuge in recent years, the considerable number of survey transects regularly devoid of geese, and the rising cost of fuel for surveying, refuge and MBM staffs agreed to target areas in 2009 with recent histories of goose detections. This reduced effort would constitute the regular annual survey, with a complete survey (i.e., replicating that done in 2006–2008) planned for five-year intervals.

Refuge staff elected to discontinue participation in any Interior spring breeding pair survey efforts because of equivocal results from the 2007 and 2008 efforts, as well as the ambiguous status of geese observed during spring surveys (i.e., those remaining to breed on/near KANWR versus those migrating further on to breed; again, see Fischer 2009 addendum). An aerial waterbird breeding pair survey of the Refuge and nearby areas was done on May 23, 2009, by MBM for the second consecutive year, however. Results from this effort were not available for inclusion or discussion in this report.

Study Area and Methods:

“Official” Observations

This survey originated in 2001, was finalized by 2003, and was conducted consistently from 2006–2008 (see Saperstein 2005 and Harwood 2006, 2007, 2008). We consider “official” survey observations to be those obtained via annually repeatable survey methods on 101 aerial transects overlaying goose habitat within KANWR proper, as well as the Lake Todatonten area and the terminus of the Kanuti River, from its confluence with the Koyukuk River, upriver to the downstream end of Kanuti Canyon (Fig. 1). A non-statistical analysis of the distribution and abundance of white-fronts detected via “official” survey methods over the history of the survey indicated that white fronts were largely detected in three core areas: (1) the Mud Lakes and Kanuti River down to the confluence of the Kanuti Kilolitna River; (2) Katalahosa Lake area, and; (3) South Fork Koyukuk River/Fish Creek area. The latter two areas appear to be more recently occupied (i.e., the Mud Lakes/Kanuti having always been good). To streamline this survey, 25 transects covering these three core areas (12, 5, and 8 each for the South Fork, Katalahosa, and Mud Lakes/Kanuti areas, respectively) were selected for a reduced effort survey. Survey and data collection methods follow those described in Harwood (2006, 2007) and Saperstein (2005). The refuge-owned Scout aircraft configured on floats was again used for all flying. In general, the historically surveyed transects/areas and the survey methods employed therein have represented an attempt to have a consistent survey effort to allow interannual comparisons. This 2009 reduction of the number of transects (from 101 to 25) represents a subsample of the historical set flown.

“Unofficial” Observations

Unofficial observations are composed of observations made: a) within the historical study using methods not easily replicated between years, thus compromising consistent interannual effort (aka “incidental”); and b) outside the historical study area (aka “supplemental,” Fig. 2). “Incidental” and “supplemental” observations (i.e., “unofficial”) are recorded separately from official in this report.

Further analysis of historical goose distribution and abundance indicated regular detections along several river segments. These segments, though intersected by transects, tend to be sinuous and/or south-north trending, however, and thus not well suited to east-west transects. A more efficient and likely more effective (yet ultimately less repeatable) aerial surveying method thereof is by close, regular circling, rather than intercepting intermittently with transects. Two areas within the historical study area, the Kanuti River (from the Kanuti Kilolitna River mouth downriver to the Katalahosa Lake area transects, then west of same transects to beginning of Kanuti Canyon) and Kanuti Chalatna Creek, were selected for “unofficial” surveying by circling. Furthermore, outside the historical study area, the greater main stem Koyukuk River corridor (e.g., including its immediate oxbows and other potential goose habitat) from Old Bettles to the Kanuti River mouth was also included in this “unofficial” survey because of recent substantial Canada Goose observations there (Fig. 2).

Results:

General Conditions

Spindler and Valle completed surveying of all official and unofficial areas during July 10-11, 2009. On July 10, all transects in the South Fork/Fish Creek and Mud Lakes/Kanuti River areas, as well as a small portion of the main stem Koyukuk River, were surveyed. Transects in the Katalahosa Lake

area were tried but aborted because of poor survey conditions at the time (e.g., strong wind and turbulence). Survey conditions for July 10 were as follows:

Sky = clear, with some high scattered clouds early; by 15:00 ADT, ceiling was high overcast

Visibility = ≥ 30 miles

Wind = at 0900, winds light (5 mph) from S; increasing in afternoon to 10 mph from W, up to 15 mph by 1400

On July 11, the Katalahosa Lake area was resurveyed (this time with adequate conditions). Lake Todatonten, the Kanuti River mouth, the Kanuti River upriver [to Kanuti Kilolitna River] and downriver [to Kanuti Canyon] of the Katalahosa Lake area transects, Kanuti Chalatna Creek, and the remaining main stem Koyukuk River were all surveyed. Survey conditions were as follows:

Sky = overcast

Visibility = ≥ 30 miles

Wind = generally calm, up to 5 mph from W

Total flight time (15.6 hr, \$1638) for the project included: 0.5 hr for a check ride, 2.1 hr ferrying Scout from Fairbanks to Bettles, and 13 hr for official and supplemental surveying on July 10-11 (6.5 hr each day).

“Official” Goose Observations

Totals of 548 white-fronts (425 adults and 123 young) and 313 Canada Geese (134 adults and 179 young) were observed during official surveying. Geese were observed on 9 of 25 transects (white-fronts and Canada Geese on 6 and 7, respectively; Table 1; Fig. 1). Eighty-six percent (i.e., 365 individuals) of adult white-fronts were detected on only 2 transects, with 330 (78%) individuals in the “Mud Lakes” proper; however, no young white-fronts were detected at Mud Lakes. No geese were observed at Lake Todatonten. A multi-year comparison of official geese detections is provided in Table 3.

“Unofficial” Goose Observations

An additional 308 Canada Geese (142 adults and 166 young) were observed on sloughs, oxbows, and backwaters along the Koyukuk River (outside of the study area, yet still largely within the Refuge boundary; Table 2; Fig. 2); however, only 8 white-fronts were observed. Surveys while flying tight circles (i.e., following the watercourse, rather than intercepting occasionally with transects) over the Kanuti River (upriver and downriver of Katalahosa Lake area transects) and Kanuti Chalatna Creek yielded an additional 61 white-fronts (22 adults and 39 young) and 34 Canada Geese (14 adults and 20 young). None of these observations were used in comparisons with previous years’ surveys.

All Goose Observations

All told among official and unofficial observations, 615 white-fronts (449 adults, 166 [27%] young) and 655 Canada Geese (290 adults, 365 [56%] young) were observed over the two days.

Other Wildlife Observations

The crew observed 73 adult and ≥ 31 young swans along transects, plus another 4 adults during incidental efforts. Thirty-one moose (28 adults, 3 calves) were also observed.

Discussion points

1) The desired effect of improving survey efficiency by reducing the survey effort without grossly compromising the number of white-fronts observed was indeed achieved. First, the number of survey days (and not unimportantly, flight costs) was cut in half. Secondly, pre-survey predictions of recent years' white-front distribution (i.e., through selection of three core transect areas) held true; the highest number of adult (not to mention second highest number of observed young) white-fronts in the history of the survey was recorded.

2) The Mud Lakes complex, supporting 86% of adult white-fronts observed during "official" surveying, continues to be the most important local molting area for adult white-fronts. Interestingly, no young white-fronts were observed there, despite the second highest number of young observed to date. In contrast, no geese were observed at Lake Todatonten for the *third* year in a row. The crew again observed very shallow water at survey time, with even completely dry areas of the lake evident in September.

3) The original intent of the survey was to monitor primarily white-front distribution and abundance. Indeed, the "official" survey (i.e., transect areas, Lake Todatonten, Kanuti River mouth) ostensibly does a good job at this, with 95% of all adult white-fronts (425 of 449) detected during this phase. On the other hand, only 46% (134 of 290) of all Canada Geese were detected during the official phase. Clearly the supplemental surveying, particularly along the main stem Koyukuk River, is an important tool for better tracking molting and breeding Canada Geese on the refuge. Data from this report should not be considered as population estimates, but rather a "minimum count."

4) While it appears initially at least that a reduced effort can obtain results not unlike those of prior years' complete efforts, the need to periodically expend the full effort should not be overlooked. At least every five years all transects should be surveyed to document any changes in distribution and/or abundance on/near the refuge. Similar molting surveys of white-fronts elsewhere in Alaska (e.g., Koyukuk and Innoko NWRs) have indicated population growth. As growth occurs, the population may expand into recently unutilized habitats, so it is advisable to periodically survey all 101 transects. Given the recent demise of Lake Todatonten as a prominent molting site reinforces how quickly the possible suitability of such sites can change, and how goose distributions can follow suit.

Literature Cited:

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Table 1. **Official**¹ goose observations by transect during aerial goose surveys, Kanuti NWR, Alaska, July 10–11, 2009. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose.]

Transect	Species	Number ²	
		Adults	Young
25 ³	GWFG	197	0
29 ³	GWFG	168	32
	CAGO	21	17
35 ³	GWFG	16	12
	CAGO	1	0
50 ⁴	GWFG	8	26
51 ⁴	GWFG	26	20
	CAGO	28	44
52 ⁴	GWFG	4	11
	CAGO	56	72
90 ⁵	CAGO	8	8
93 ⁵	CAGO	14	29
95 ⁵	CAGO	6	9
Kanuti R. terminus	GWFG	6	22
Total	GWFG	425	123
	CAGO	134	179

¹ Geese observed on transects, at Lake Todatonten, or at terminus of Kanuti River.

² Geese in different groups on transect were combined.

³ Transects in Mud Lakes/Kanuti River area.

⁴ Transects in Katalahosa Lake area.

⁵ Transects in South Fork Koyukuk River/Fish Creek area.

Table 2. **Unofficial**¹ goose observations during aerial molting survey, Kanuti NWR, Alaska, July 10–11, 2009. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose.]

River Segment	Species	Number	
		Adults	Young
Koyukuk River ²	CAGO	32	39
Koyukuk River ²	CAGO	24	6
Koyukuk River ²	CAGO	8	20
Koyukuk River ²	CAGO	10	15
Koyukuk River ²	GWFG	2	4
	CAGO	16	21
Koyukuk River ²	CAGO	20	40
Koyukuk River ²	CAGO	32	25
Subtotal ²	GWFG	2	4
	CAGO	142	166
Kanuti River ³	CAGO	14	20
Kanuti River ³	GWFG	8	15
Chalatna Creek ³	GWFG	8	15
Chalatna Creek ³	GWFG	4	7
Chalatna Creek ³	GWFG	2	2
Subtotal ³	GWFG	22	39
	CAGO	14	20
Grand Unofficial Subtotal ¹	GWFG	24	43
	CAGO	156	186
Combined Official/Unofficial Total ⁴	GWFG	449	166
	CAGO	290	365

¹ Observations made outside “official” study area or during incidental efforts within official survey area

² Geese were outside official study area

³ Geese observed along rivers surveyed by circling, rather than transect method

⁴ Includes both official and unofficial observations

Table 3. Goose and swan observations¹ by year during aerial goose surveys, Kanuti NWR, Alaska, 2001–2003, 2006–2009. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose; ad = adults, yg = young]

Year	GWFG ad	GWFG yg	CAGO ad	CAGO yg	Swan ad	Swan yg
2001	332	142	67	54	91	6
2002	117	50	101	128	103	14
2003	313	65	52	78	108	13
2006	332	71	108	95	219 ²	37 ²
2007	280	100	124	190	189 ²	70 ²
2008	308	0	116	163	211 ²	57 ²
2009 ³	425	123	134	179	73 ²	31 ²

¹ Does not include observations made outside “official” study area or during incidental efforts

² represents minimum counts

³ represents reduced effort

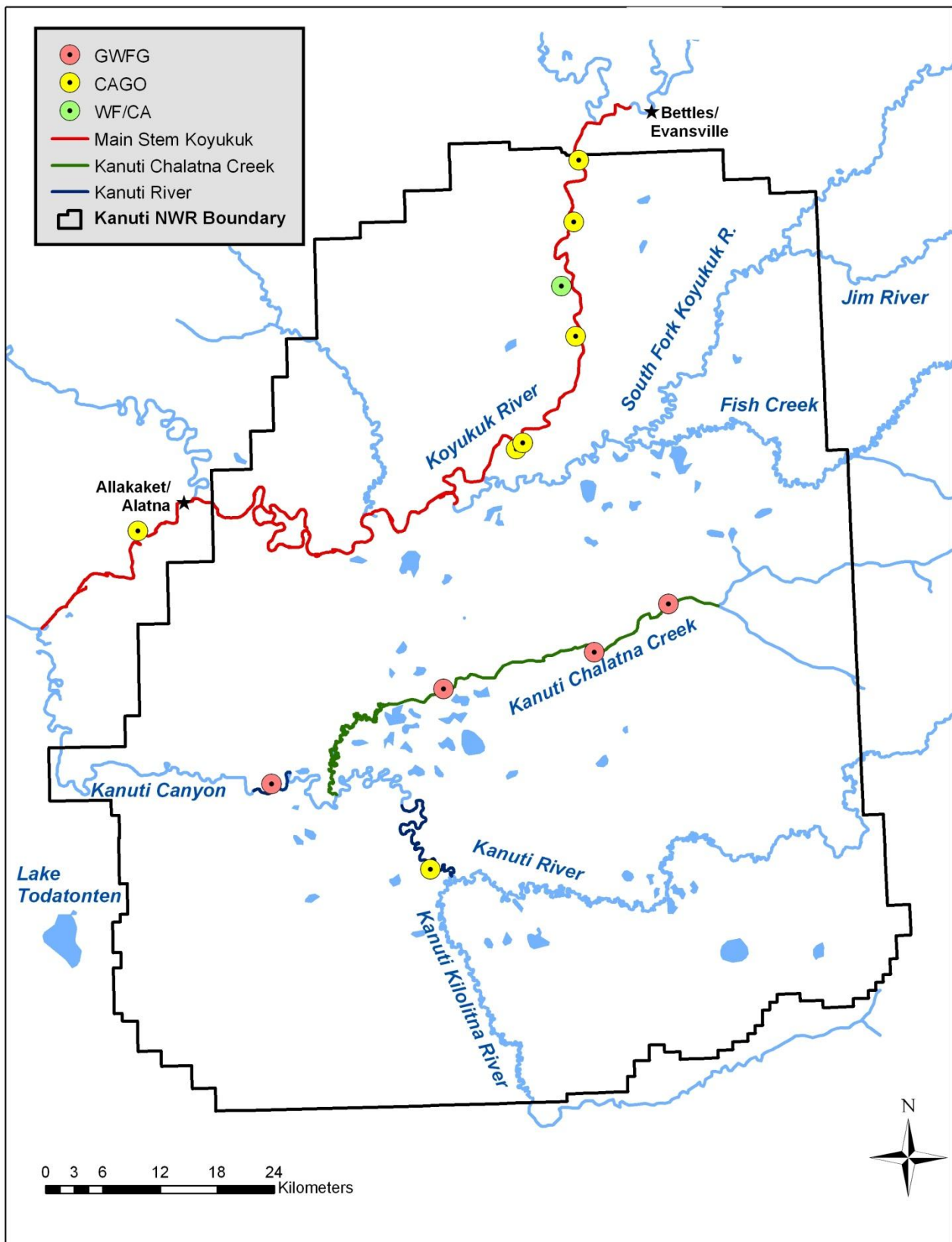


Figure 2. Locations of supplemental river surveys and “unofficial” goose observations, July 10-11, 2009, Kanuti NWR. [GWFG = Greater White-fronted Geese, CAGO = Canada Geese; WF/CA = both geese species co-located]

Attachment: Memo from Julian Fischer (filename = *Kanuti surveys.doc*) in 2 April 2009 to Christopher Harwood (carbon copied to Lisa Saperstein and Mike Spindler)

Thoughts on Kanuti NWR white-fronted goose survey efforts. Julian Fischer 4/2/2009

Differing Missions and Scales

I believe MBM and Refuges monitor bird population on different scales, and this influences what we promote as priority activities for each of our respective programs. For MBM, we focus on broad-scale, population level surveys that can be used for management indices and ultimately harvest regulations. Wherever possible, surveys are multi-species. Species-specific surveys are typically conducted only when significant population level conservation concerns are apparent. Refuges, on the other hand, have local constituents and defined boundaries in which to focus their efforts. For that reason, a conservation concern for a single species may be a very important issue within the boundaries of a given refuge even if the net impact to the continental population may be insignificant.

These two different scales of interest came together in the late 1990s as a result of Mike Spindler's insights and concern for what appeared to be a localized decline of white-fronted geese. Due to his energy and leadership, studies were initiated that identified differences in migration timing, routes, and winter distribution. This provided the needed information to institute changes in site-specific hunting regulations, and a more conservative approach to harvest management in the updated Flyway Management Plan. It is always difficult to determine a cause and effect response, but it is heartening to note that the indices that were used to identify a regional decline have since returned to levels observed in the early 1990s.

Breeding Population Surveys

Continentially there has been a movement among goose managers to move away from winter surveys and towards breeding pair surveys to provide data for management. A few years ago, I was hopeful that the Alaska boreal midcontinent population could be monitored through a multi-refuge coordinated breeding pair survey. Perhaps this was naïve. Mike had already described the difficulty in detecting white-fronts in the boreal forest, especially when nesting is initiated. Nonetheless, we (MBM, Selawik, Koyukuk, and Kanuti) all tried it. I believe we were successful in Selawik, but less so at Koyukuk and Kanuti.

The reason it worked well at Selawik, I believe, is threefold: the habitat is taiga rather than boreal forest which allows for far better visibility; the Selawik population is at the terminus of the subpopulation migration route; and the refuge headquarters is located next to the breeding site allowing for relatively inexpensive scouting flights to determine appropriate timing. It is possible that breeding pair surveys could be improved for Koyukuk and Kanuti, but precise and accurate estimates would likely require a significant increased cost in time and funding and a yet undiscovered method to account for detection probability and overflight of birds towards more northerly breeding areas. Managers should consider several facts before pursuing such efforts further: 1) on a continental scale, the midcontinent white-front population is rebounding following more restrictive harvest measures as detailed in the Flyway Management Plan, and in changes to the AMBCC harvest regulations in staging areas (closure of harvest under subsistence regulations in Delta Junction); 2) regionally, molting survey data suggests numbers have returned to early 1990 levels in Koyukuk-Nowitna NWR; 3) annual survival estimates in the interior component of the midcontinent population has increased over the last few years; 4) annual surveys conducted by MBM (continental BPS- N754) provide estimates of white-fronts in all interior refuges (albeit with low precision); and 5) periodic "Expanded Breeding Pair Surveys" conducted by MBM provide estimates of population size and distribution with greater precision than the annual survey. For these reasons, it is difficult for MBM to promote a species-specific breeding pair survey for white-fronts within the interior refuges as a high priority task.

As for the molting survey at Kanuti, significant changes in design and implementation are warranted, but the survey should continue as one element of the refuge monitoring effort. Past surveys have demonstrated that the population of molting white fronts is small (a few hundred birds), and traditionally

many of those birds were at Todatonten, outside refuge boundaries. While the area doesn't appear to be important on a population level, it may be important locally, both to subsistence hunters, and as a component of the refuge ecology (*Spring/summer subsistence harvest of white-fronts in the Kanuti area has been reported to be around 75 birds annually. (This suggests that there is a local reliance on these birds and depending on when the harvest occurs, could be a limiting factor for the species in the refuge. Unfortunately, the AMBCC survey does not distinguish between spring and summer harvest. If the harvest is taking place in spring, then most geese harvested are likely passing through to breeding sites further north. If the harvest is occurring in summer, then they are likely local breeders/molters, and the impact the reported harvest on a small population will certainly keep the population very low).* Thus it seems prudent for the refuge to remain aware of any significant shifts in the numbers of molters on the refuge. That said, it is clear that significant efficiencies can be achieved in the design of the survey. Given the numbers of birds and the well established distribution, I believe the survey could be completed in a single day effort. I presume that the refuge possesses all the point locations, or at least transect numbers associated with molt surveys since 2000. If the survey area was pared down to include 80% of historical observations, then total flight time would be significantly reduced. There would be a slight loss of comparability to previous year's survey results but it would be a reasonable sacrifice. I would then advocate an effort to fly the full complement of transects that contained 100% of historical observations once every five years. I suspect that by mapping out 100% of molting goose locations you would find room for significant efficiencies as well. Results of the expanded molting goose survey on a 5-year interval will provide information about the proportion of geese that occur outside of the core surveyed area, and will reveal changes in distribution.

Distribution

Despite the difficulties associated with population surveys, important localized information on habitat use can be obtained from aerial surveys. Such information, I believe, may be important for land managers (i.e. Refuge Managers) as they grapple with various issues that may impact their refuges. Distribution of white-fronts at all phases of their life cycle is important to understand, regardless of their ultimate breeding site. Without intact and productive staging habitats, white-fronts will be hard pressed to breed and raise young successfully. ANILCA specifies that Kanuti is to conserve greater white-fronted goose populations and habitats, and as far as I know this is not limited to local breeders; rather it would include all white-fronts that use the refuge even for a stopover period. A number of years of May survey data from various sources (refuge, MBM) should provide a relatively clear picture of where your hot spots are. From reading your reports it seems that the most notable locations are the Mud Lakes region, the confluence of the South Fork Koyukuk and Fish Creek, and the confluence of the Chalatna Creek and Kanuti River. I suspect the same locations are important during the molting period, but you should examine those data to confirm that assumption. Replication of full molting surveys on a 5-year schedule, as described earlier, will help reveal significant changes in distribution.

The situation at Todatonten Lake that you describe is a compelling problem. I am not sure if BLM is aware of the former significance of the area and the apparent change in distribution of geese away from the lake. Perhaps further investigations can be made under the umbrella of climate change studies.

Production

The status of migratory birds can be monitored in various ways. In an ideal world we would have estimates of breeding population size, annual productivity, annual survival, and harvest estimates for each and every species that occurs on the refuge. Although breeding population size is very difficult to monitor annually for this species in the boreal forest, productivity is a measure that can be monitored. The molting survey is one method of estimating production, but as noted in the report, weather conditions can affect detection of broods from an aerial platform, and detection of non or failed-breeders is likely far higher than for successful breeders – a situation that can lead to biased estimates of production. An alternative method is to monitor production through a float survey along the Kanuti River. The method was written up in a Kanuti NWR report by Merry Maxwell in 2001, and appears to be a relatively efficient way to calculate

production. According to the report the effort required 2 people for 2 full days. While the total numbers of adult birds are likely to be fewer than seen by air, a more accurate assessment of production is likely result. It sounds like these float data go back to the mid 1990s, and were stopped in 2000. There may be logistical reasons that the survey was dropped, but if not, the refuge should consider this as a method to calculate production. This effort would complement the 13 year data set of comparable efforts on the Koyukuk/Nowitna refuge. MBM is currently attempting to devise a method to estimate interior region production through age ratio work at the fall staging area in Delta Junction. I recently encouraged a graduate student to take this project on, and he'll be starting UAA next year. It would be useful to have refuge specific production estimates to compare with interior region estimates.

Summary

The refuge should not proceed with additional spring breeding pair surveys of white-fronted geese, but should visit key stopover locations when standard flights spring phenology flights are conducted; molt surveys should continue annually but with a significantly reduced area coupled with a survey at the current design once every 5 years; and renewal of float surveys should be considered as a method to monitor productivity. Please feel free to give a call if you want to talk about any of this further.